

## Medicine and Drugs

- Introduction

- What is a drug or medicine?
  - Alter mood or emotions
  - Alter a physiological state
  - Alter incoming sensory sensations
- Administer drugs:
  - Oral
  - Rectal
  - Inhalation
  - Injection
  - Patches
- LD50:
  - See how toxic a molecule might be (smallest is the most toxic)
  - Lethal Dose: a substance that kills off 50% of a population
- Placebo effect: hints at our brain's ability to influence our physiology
- Drug tolerance: how much chemical can be taken to the body before undesirable symptoms occur

- Antacids

- Neutralize excess acid in the stomach to adjust the stomach pH
- Relieve indigestion and allow damage done by excess acid to the stomach lining to repair itself
- Combine with alginates that produce a neutralising layer that prevents acid reflux
- Equations:

• $\text{MgO} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2\text{O}$	• $\text{Mg}(\text{OH})_2 + 2\text{HCl} \rightarrow \text{MgCl}_2 + 2\text{H}_2\text{O}$
• $\text{Al}(\text{OH})_3 + 3\text{HCl} \rightarrow \text{AlCl}_3 + 3\text{H}_2\text{O}$	• $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
• $\text{NaHCO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2$	

- Alkalosis is a rise in the pH of blood
- Al is better than Mg because neutralized more mol

- Analgesics

- Relieves pain without aid of sleep
- Mild Analgesics: work at the side of pain

	Salicylic Acid	Aspirin	Paracetamol
Problems	<ul style="list-style-type: none"> <li>• Too acidic</li> </ul>	<ul style="list-style-type: none"> <li>• Lead to stomach bleeding</li> <li>• Allergic reactions</li> <li>• Liver/brain disease</li> <li>• acidosis (low pH of blood)</li> </ul>	<ul style="list-style-type: none"> <li>• No side effects of Aspirin</li> <li>• Massive liver damage</li> </ul>

- Strong Analgesics: go straight to the brain
  - Morphine
  - Codeine
  - Heroin

- Opiate
  - Opium poppy
  - Cause addiction

Short term effects	Long term effects
<ul style="list-style-type: none"> <li>• Induce a feeling of euphoria</li> <li>• Dulling of pain</li> <li>• Depress nervous system</li> <li>• Slow breathing and heart rate</li> <li>• Cough reflex inhibited</li> <li>• Nausea and vomiting</li> <li>• High doses--coma and/or death</li> </ul>	<ul style="list-style-type: none"> <li>• Constipation</li> <li>• Loss of sex drive</li> <li>• Disrupts menstrual cycle</li> <li>• Poor eating habits</li> <li>• Risk of AIDS, hepatitis, etc. through shared needles</li> <li>• Social problems, e.g. theft, prostitution</li> </ul>

- Depressants

- Calm and relax the central nervous system by interfering with nerve impulse transmission.
- Slow down activity of the brain and other organ
- Reduce rate of breathing and dull emotion responses
- Effect:

Low dose	Moderate dose	Higher dose	Extremely high dose
• Little or no effect	• Induce sedation	• Induce sleep	• Death

- Types:

Tranquilizer	Sedative	Hypnotic
• Do not produce sleep	• Soothing of distress • Without sleep	• Produce sleep

- Ethanol:  $C_2H_5OH$

- Alcohol:

Short term effect	Long term effect
<ul style="list-style-type: none"> <li>• Feeling of relaxation</li> <li>• Increase confidence</li> <li>• Dilates small blood vessels (warmth)</li> </ul>	<ul style="list-style-type: none"> <li>• Feeling of relaxation</li> <li>• Heart disease/ high blood pressure</li> <li>• Miscarriages/ deformities</li> </ul>

- Synergistic effects: combination of two drugs is more harmful than either drug taken alone
  - Alcohol + sleeping pills: increase risk of heavy sedation, even leading to coma and death
  - Alcohol + aspirin: stomach bleeding
- Breathalyser:
  - $K_2Cr_2O_7$  as oxidising agent
  - $+ C_2H_5OH \rightarrow CH_3COOH$
  - From orange to green if there is alcohol
  - Oxidation # change of Cr change from 6 to 3

- Stimulants

- Stimulated the brain and the central nervous system by increasing the state of mental alertness
- Mimic effects of stimulated sympathetic nervous system
- Sympathomimetic drugs: substances that mimic the effects of the sympathetic nervous system
- Types and its effect:

Caffeine	Nicotine
<ul style="list-style-type: none"> <li>• Diuretic</li> <li>• Alertness</li> <li>• Restlessness</li> </ul>	<ul style="list-style-type: none"> <li>• Addiction</li> <li>• Lead to lung disease, ulcers, and cancer</li> <li>• Withdrawal symptoms:               <ul style="list-style-type: none"> <li>○ Cravings, nausea, depression</li> <li>○ Weight gain, insomnia, irritability</li> </ul> </li> </ul>

- Antibacterial

- Infectious agents:

Bacteria	Virus
<ul style="list-style-type: none"> <li>• Consisting of circular strand of DNA</li> <li>• Rigid cell walls are made of protein-sugar</li> <li>• Cytoplasm contains enzymes to break down food and build cell parts</li> </ul>	<ul style="list-style-type: none"> <li>• Reproduce only inside a living cell using its enzymatic machinery</li> <li>• Attach to host cell and control them</li> <li>• DNA surround by capsid (protein coat)</li> </ul>

- Broad and narrow spectrum:

Broad spectrum	Narrow Spectrum
• Effective against wide variety of bacteria	• Effective against only certain types

- Penicillin G:

- First penicillin used
- Deactivated by stomach acid, had to be injected